

WHAT IS CLAIMED IS:

1. An apparatus for implantation at a branch in a lung for assisting exhalation from a region of the lung to be isolated, the branch comprising a main passage, said main passage
5 bifurcating into a first branch communicating with a healthy region of the lung and a second branch communicating with an unhealthy region of the lung to be isolated, the apparatus comprising:

a tubular support structure implantable within the branch,
10 the support structure comprising a first end, a second end, and a lateral opening in the wall of the support structure between said first and second ends;

a tubular member comprising an inlet end, an outlet end defining an inner lumen at least partially within the support
15 structure, such that the tubular member being carried by the support structure such that the inlet end is disposed proximate the first end, and the outlet end is disposed proximate the lateral opening, the tubular member defining an outer lumen between its outer surface and the support structure; and

20 a first valve disposed across the outer lumen, the first valve configured for permitting flow through the outer lumen towards the inlet end of the tubular member, the first valve also configured for limiting flow through the outer lumen towards the outlet end of the tubular member air passing through the inner

lumen from the inlet end to the outlet end, will generate a vacuum in the lateral opening.

2. The apparatus of claim 1, wherein the support structure
5 is expandable between a contracted condition for facilitating insertion into the lung, and an enlarged condition for implantation within the branch.

3. The apparatus of claim 2, wherein the support structure
10 comprises a tubular mesh.

4. The apparatus of claim 3, wherein the housing comprises engagement elements for engaging tissue surrounding the branch.

15 5. The apparatus of claim 1, wherein the support structure comprises a housing, and wherein the tubular member and the first valve are substantially permanently attached to the housing.

6. The apparatus of claim 1, wherein at least one of the
20 tubular member and the first valve are attached to the support structure.

7. The apparatus of claim 1, further comprising one or more struts extending between the outer surface of the tubular member and the support structure.

5 8. The apparatus of claim 1, further comprising a second valve for limiting flow into the unhealthy region.

9. The apparatus of claim 8, wherein the second valve is configured to open when a vacuum is generated in the lateral
10 opening to allow air flow into the lateral opening towards the second end of the support structure.

10. The apparatus of claim 9, wherein the second valve is configured to close when a vacuum is absent from the lateral
15 opening, thereby preventing air flow into the unhealthy region.

11. The apparatus of claim 8, wherein the second valve is attached to the support structure proximate the lateral opening.

20 12. The apparatus of claim 1, wherein the first end of the support structure and the outlet end of the tubular member have a predetermined relative cross-section for generating a predetermined vacuum in the lateral opening when air passes through the inner lumen and out of the outlet end.

13. A lung assist device comprising:

a tubular support structure, said support structure having
an opening in the wall thereof,

5 a tubular element housed in said support structure,

a first valve located in the space between said support
structure and said tubular element;

a second valve located in said opening,

said device being adapted to be located in the passageway of
10 a lung.

14. The device of claim 13 wherein said first valve is
configured to be closed when said second valve is open and
wherein said second valve is configured to close when said first
15 valve is open.

15. The device of claim 14 wherein said opening opens into
a third tubular element.

20 16. The device of claim 15 wherein said second valve is
located in said third tubular element.

17. A lung assist device comprising:

a tubular support structure having an opening in the wall thereof,

a venturi tube housed in said support structure, said venturi tube having an aperture in the wall thereof which
5 aperture is proximate said opening, and

a valve controlling the flow through said opening, said valve being configured to permit flow in one direction, but to block flow in the opposite direction.

10 18. The device of claim 17 wherein said support structure comprises a mesh.

19. The device of claim 17 wherein the opening in the side of the support structure is coupled to a tubular member.

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20. The device of claim 19 wherein said valve is attached to the support structure.

21. The device of claim 19 wherein the valve is attached to
20 the tubular member.

22. The device of claim 20 wherein the valve is attached to the tubular member.